Claims

What is claimed is:

1   1. An optical send-receive module comprising:

2   a frame having a front, a back side, and a top section;

3   a lens carrier attached to the front of the frame, the lens carrier including a lens

4 which faces forward;

5   an integrated circuit carrier placed within the top section of the frame;

6   first metal leads which electrically connect components within the lens carrier to

7 an integrated circuit within the integrated circuit carrier; and,

8   second metal leads which extend from the integrated circuit carrier, along the top

9 section of the frame, down the back side of the frame and extend under the frame.

1   2. An optical send-receive module as in claim 1, wherein the frame additionally

2 includes:

3   first slots along the back side of the frame, the second metal leads being placed in

4 the first slots.

1   3. An optical send-receive module as in claim 2, wherein the frame includes

2 second slots along the top section, the first metal leads being placed in the second slots.

1   4. An optical send-receive module as in claim 1, wherein the lens carrier is

2 attached to the front of the frame so that a bottom of the lens carrier extends down below

3 a bottom of the top section of the frame.

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1 5. An optical send-receive module as in claim 1, wherein the lens carrier includes

2 a first lens which houses a light emitting diode and a second lens which houses a photo

3 diode.

1 6. A method for manufacturing an optical send-receive module comprising the

2 following steps:

3 (a) forming a frame, the frame having a front section, a back side, and a top

4 section;

5 (b) molding a lens carrier and a universal chip carrier, the lens carrier and

6 universal chip carrier being co-planar and being connected by a first set of metal leads, a

7 second set of metal leads extending out from the universal chip carrier; and,

8 (c) placing the lens carrier and the universal chip carrier within the frame, wherein

9 the lens carrier is attached to the front section of the frame, and the first set

10 of metal leads are bent so that a lens included within the lens carrier faces forward, and

11 the second metal leads are bent so that they extend from the ~~integrated~~

x 12 ~~circuit~~ Universal chip carrier, along the top section of the frame, down the back side of the frame and

13 extend under the frame.

1 7. A method as in claim 6 wherein:

2 step (a) includes forming first slots along the back side of the frame; and,

a 3 step (b) includes placing the second metal leads in the first slots.

1 8. A method as in claim 7 wherein:

2 step (a) includes forming second slots along the top section of the frame; and,

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second

❷ 3   step (b) includes placing the first metal leads in the slots.

1   9. A method as in claim 6 wherein step (c) includes attaching the lens carrier to

2   the front section of the frame so that a bottom of the lens carrier extends down below a

3   bottom of the top section of the frame.

1   10. A method as in claim 9 additionally comprising the following step:

2   (d) attaching the frame to a printed circuit board, the bottom of the top section

3   resting on the printed circuit board, the front section extending over a side of the printed

4   circuit board so that the bottom of the lens carrier extends down below a top of the printed

5   circuit board.

1   11. A method as in claim 9 additionally comprising the following step:

2   (d) attaching the frame to a printed circuit board, the bottom of the top section

3   resting on the printed circuit board, the front section extending down inside a cut out

4   portion of the printed circuit board so that the bottom of the lens carrier extends down

5   below a top of the printed circuit board.

1   12. A method as in claim 6 additionally comprising the following step:

2   (d) attaching the frame to a printed circuit board, the frame being flipped over so

3   that a top of the top section rests on the printed circuit board.

1   13. A module used for wireless communication, the module comprising:

2   a frame having a front, a back side, and a top section;

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3   a lens carrier attached to the front of the frame, the lens carrier including a lens

4   which faces forward;

5   an integrated circuit carrier placed within the top section of the frame;

6   first metal leads which connect the lens carrier to an integrated circuit within the

7   integrated circuit carrier; and,

8   second metal leads which extend from the integrated circuit carrier, along the top

9   section of the frame, down the back side of the frame and are bent under the frame.

1   14. A module as in claim 13 wherein the frame additionally includes:

2   first slots along the back side of the frame, the second metal leads being placed in

3   the *first* slots.

1   15. A module as in claim 14 wherein the frame includes second slots along the

2   top section, the ~~second~~ *first* metal leads being placed in the second slots.

1   16. A module as in claim 13 wherein the lens carrier is attached to the front of the

2   frame so that a bottom of the lens carrier extends down below a bottom of the top section

3   of the frame.

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